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• Uchikura, Takao,  
c/o Hamura R&D Center  
Hamura-chi, Tokyo 190-11 (JP)  
• Muroi, Katsumi,  
c/o Hamura R&D Center  
Hamura-chi, Tokyo 190-11 (JP)

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(74) Representative: Grünecker, Kinkeldey,  
Stockmair & Schwanhäusser  
Anwaltssozietät  
Maximilianstrasse 58  
80538 München (DE)

(71) Applicant: CASIO COMPUTER COMPANY  
LIMITED  
Shinjuku-ku Tokyo 160 (JP)

(72) Inventors:  
• Ishikawa, Hiroyuki,  
c/o Hamura R&D Center  
Hamura-chi, Tokyo 190-11 (JP)

### (54) Radio communication system and radio communication terminal

(57) In a PHS terminal (4a), a system calling code for identifying a system in which the PHS terminal (4a) is registered and a slave ID number for discriminating the PHS terminal are stored in advance in an ID chip (28). While a user is out, he or she sets the ID chip (28) in another PHS terminal (4b) which does not have the same system calling code as that of the PHS terminal (4a). When the user performs an operation for peer-to-peer communication on the PHS terminal (4a), the PHS terminal (4b) is called using a controlling physical slot. The PHS terminal (4b) recognizes that it is called by discriminating a system calling code and a PS calling number of the physical slot on the basis of the system calling code of the ID chip (28), and then transmits a response signal to the PHS terminal (4a) based on the system calling code and PS calling number of the ID chip (28). Thus, peer-to-peer communication can be performed even between radio communication terminal (4)s which do not have the same system calling code.

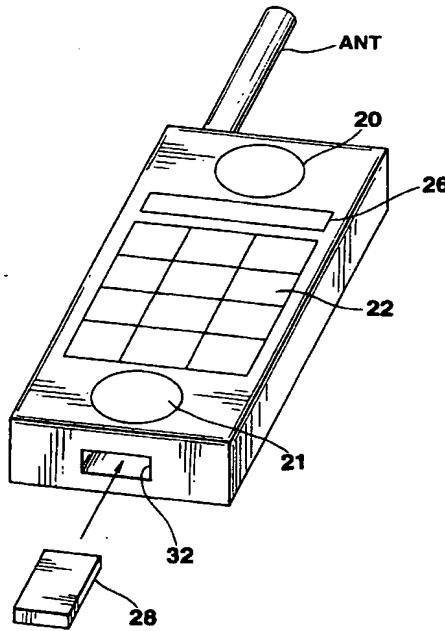


FIG.3

## Description

The present invention relates to a radio communication system and a radio communication terminal for performing a radio communication between radio communication terminals having system codes.

A radio communication system has recently been known to the public, which includes a radio communication terminal carried by a user, such as a portable telephone, a PHS (personal handy-phone system) terminal, a pager, and a PDA (personal digital assistant), for intercommunicating sound and data with another terminal including a commonly-used domestic telephone, and a base station connected to a communication network and communicating with the radio communication terminal to connect the terminal to the network.

In this system, the radio communication terminal is driven by a secondary battery or the like such that it can be carried by a user, and capable of storing various types of data items such as callee's telephone numbers and addresses, schedule, and memorandum using characters and sound and transmitting/receiving information (sound, sound data, text data, image data, etc.) to/from another terminal through a telephone network.

As one example of the radio communication system, there is a PHS which is currently put to practical use in Japan. The PHS will now be described for understanding of the radio communication system.

A radio communication terminal of the PHS is employed as a slave of a master (base station) placed in a home. When the terminal is operated outdoors, it is also connected to a communication network through base stations (public and self-supporting stations) connected to the telephone network, with the result that it is allowed to intercommunicate with another terminal. If, furthermore, radio communication terminals are registered as slaves of their common master, peer-to-peer radio communication can be performed between the terminals but not through the base stations.

In the peer-to-peer communication between the radio communication terminals, since the terminals necessitate a system code of their common master, all the terminals have to be brought to the master side for previous registration setting up the relation between the master and slave. In this registration, the slave ID numbers for discriminating the terminals are registered in the master, while a system calling code (part of CS-ID) for discriminating the master is registered in the slaves. In peer-to-peer radio communication between terminals, the system calling code and slave ID numbers are transmitted between the terminals, and it is determined based on the system calling code whether the peer-to-peer radio communication is possible or not. In other words, the peer-to-peer communication cannot be performed unless the system calling codes of the slaves are identical with that of the master.

The above-described radio communication terminals have the following problem. In order to perform the peer-to-peer radio communication between the termi-

nals, all the terminals have to be brought close to their common master and registered so as to correspond to the master. Therefore, the peer-to-peer radio communication cannot be done between a terminal and another terminal which is not registered in the master of the former one or between terminals which are registered in different masters.

Accordingly, it is an object of the present invention to provide a radio communication system and a radio communication terminal capable of peer-to-peer communication between a radio communication terminal and another terminal which is not registered in the master of the former terminal.

According to the present invention, there is provided a system connected to a communication network and having a system identification information, which comprises a storing medium, a first radio communication terminal having the same system identification information as the system and arranged for receiving the storing medium, and a second radio communication terminal arranged for receiving the storing medium, and in which the first radio communication terminal, when the storing medium is installed therein, copies the system identification information onto the storing medium, and the second radio communication terminal is allowed to communicate in peer-to-peer mode by a radio wave with the first communication terminal, when the storing medium on which the system identification information of the system is copied installed thereon.

According to the present invention, there is provided another system connected to a communication network and having a system identification information, which comprises a storing medium having the system identification information, a first radio communication terminal having the same system identification information as the system and arranged for receiving the storing medium, and a second radio communication terminal arranged for receiving the storing medium, and in which a second radio communication terminal, when a detachable storing medium is set thereto, copies the system identification information of the storing medium into an internal memory of the second radio communication terminal, and is allowed to communicate in peer-to-peer mode by a radio wave with a first radio communication terminal based on the system identification information copied in the internal memory of the second radio communication terminal.

According to the present invention, there is provided a still another system which comprises a storing medium, a first radio communication terminal having a same system identification information as the system and arranged for receiving the storing medium, and a second radio communication terminal arranged for receiving the storing medium, and in which the first radio communication terminal, when the storing medium is installed therein, copies the system identification information onto the storing medium, and the second radio communication terminal is allowed to communicate in peer-to-peer mode by a radio wave with

the first communication terminal, when the storing medium on which the system identification information of the system is copied installed thereon.

According to the present invention, there is provided a further system which comprises a storing medium having the system identification information, a first radio communication terminal having the same system identification information as the system and arranged for receiving the storing medium, and a second radio communication terminal arranged for receiving the storing medium, and in which the second radio communication terminal, when a detachable storing medium is set thereto, copies the system identification information of the storing medium into an internal memory of the second radio communication terminal, and is allowed to communicate in peer-to-peer mode by a radio wave with the first radio communication terminal based on the system identification information copied in the internal memory of the second radio communication terminal.

According to the present invention, there is provided a further system having a system identification information and connected to a communication network, terminal having the same system identification information as the system for communicating in a peer-to-peer mode with another radio communication terminal having the same system identification information. The radio communication terminal comprises a storing medium adapted to be detachably installed in the radio communication terminal, instruction means for outputting an instruction, and writing means for upon receipt of the instruction from the instruction means writing the system identification information of the radio communication terminal on the storing medium is installed on the radio communication terminal.

According to the present invention, there is provided a further system connected to a communication network including a radio communication terminal having an original system identification information, for communicating in peer-to-peer mode with another radio communication terminal. The radio communication terminal comprises a storing medium adapted to be detachably installed in the radio communication terminal, for storing a system identification information, selecting means for, when the storing medium having a system identification information stored thereon is installed into the radio communication terminal, selecting any one of the original system identification information and the system identification information stored on the storing medium, and communication mean for communicating with another radio communication terminal based on the system identification information selected by the selecting means.

According to the present invention, there is provided a further system having an original system identification information and connected to a communication network including a radio communication terminal for communicating in peer-to-peer mode with another radio communication. The radio communication terminal

comprises first storing medium adapted to be detachably installed on the radio communication terminal, for storing a system identification information, a first internal memory for storing a system identification information, writing means for, when the storing medium is installed on the radio communication terminal, writing the system identification information stored in the first storing medium on the first internal memory, and communication means for communicating with another radio communication terminal based on the system identification information written on the internal memory by the writing means.

According to the present invention, there is provided a further radio communication terminal having a system identification information as a system for communicating in a peer-to-peer mode with another radio communication terminal having the system identification information. The radio communication terminal comprises a storing medium adapted to be detachably installed in the radio communication terminal, instruction means for outputting an instruction, and writing means for upon receipt of the instruction from the instruction means writing the system identification information of the radio communication terminal on the storing medium is installed on the radio communication terminal.

According to the present invention, there is provided a further radio communication terminal having an original system identification information, for communicating in peer-to-peer mode with another radio communication terminal, the radio communication terminal comprising a storing medium adapted to be detachably installed in the radio communication terminal, for storing a system identification information, selecting means for, when the storing medium having a system identification information stored thereon is installed into the radio communication terminal, selecting any one of the original system identification information and the system identification information stored on the storing medium, and communication means for communicating with another radio communication terminal based on the system identification information selected by the selecting means.

According to the present invention, there is provided a further radio communication terminal for communicating in peer-to-peer mode with another radio communication, the radio communication terminal comprising first storing medium adapted to be detachably installed on the radio communication terminal, for storing a system identification information, a first internal memory for storing a system identification information, writing means for, when the storing medium is installed on the radio communication terminal, writing the system identification information stored in the first storing medium on the first internal memory, and communication means for communicating with another radio communication terminal based on the system identification information written on the internal memory by the writing means.

The accompanying drawings, which are incorporated in and constitute a part of the specification, illustrate presently preferred embodiments of the present invention and, together with the general description given above and the detailed description of the preferred embodiments given below, serve to explain the principles of the present invention in which:

FIG. 1 is a block diagram showing a configuration of a radio communication system such as a PHS terminal, according to the present invention;  
 FIG. 2 is a block diagram showing a configuration of a PHS terminal of the system according to the embodiment of the present invention;  
 FIG. 3 is a perspective view of the outward appearance of the PHS terminal of the system according to the embodiment of the present invention;  
 FIG. 4 is a block diagram showing a configuration of an ID chip in the system according to the embodiment of the present invention;  
 FIG. 5 is a conceptual view of data structure of EEPROM of the ID chip;  
 FIG. 6 is a conceptual view of data structure of CS-ID in the system according to the embodiment of the present invention;  
 FIG. 7 is a conceptual view of data structure of controlling physical slot SCCH in the system according to the embodiment of the present invention;  
 FIG. 8 is a conceptual view of data structure of part of the controlling physical slot SCCH;  
 FIGS. 9A and 9B schematically illustrate a first embodiment of the present invention;  
 FIGS. 10A, 10B, and 10C schematically illustrate a second embodiment of the present invention;  
 FIG. 11 is a flowchart showing a process of registering a peer-to-peer communication information in an IC chip in a system according to the first embodiment; and  
 FIG. 12 is a conceptual view showing a control sequence in peer-to-peer communication between PHS terminals in the system according to the first embodiment.

A preferred embodiment of a radio communication system according to the present invention will now be described with reference to the accompanying drawings. In the embodiment, the present invention is applied to a PHS terminal.

#### 1. Configuration of Radio Communication System:

FIG. 1 is a block diagram showing a configuration of a PHS system. The configuration of the PHS system is common to the first and second embodiments. In FIG. 1, reference numeral 1 indicates a nationwide normal analog telephone network or a dedicated digital network, which are generically called a communication network. A master (base station) 2 is connected to the communication network 1 and placed in a company, a

home and the like in order to connect the network 1 with a PHS terminal 4 by radio. A radio base station 3 is connected to the communication network 1 and installed outdoors, in public facilities and the like to wirelessly connect the network 1 with the PHS terminal 4 which is carried outdoors and moved to public facilities or the like.

The PHS terminal 4 is carried indoors or outdoors by a user, and makes a request to the master 2 or base station 3 for line connection by radio to communicate with another base station or another PHS terminal. As shown in FIG. 1, a PHS terminal 4a registered as a slave of the master 2 is allowed to directly communicate (peer-to-peer communication) with a PHS terminal 4b which is not registered in the same master.

The PHS terminal 4b is provided with an ID chip 28 for storing information necessary for peer-to-peer communication between terminals, such as a system calling code for discriminating the slave when the PHS terminal 4a is registered in the master. Alternately, information necessary for peer-to-peer communication with the terminal 4a and stored in the ID chip 28 is copied into an internal memory in the terminal 4b. As a result, based on the information stored in the ID chip 28 or the information copied into the internal memory, peer-to-peer communication is performed between the PHS terminals 4a and 4b. The details of the ID chip 28 will be described later.

#### 2. Configuration of PHS Terminal:

FIG. 2 is a block diagram showing a configuration of the PHS terminal 4 described above. In FIG. 2, a transmitting/receiving section 10 includes a frequency converter having both a receiver 11 and a transmitter 12 and a modem (digital modulator/demodulator) 13 having a transmitting/receiving function.

The receiver 11 mixes a signal, which is received by an antenna ANT and supplied through an antenna switch 14, with a local oscillation signal having a predetermined frequency output from a PLL synthesizer 15, to convert the received signal into an IF (intermediate frequency) signal whose frequency ranges from 1.9 GHz to about 1 MHz.

The transmitter 12 mixes a modulated signal of  $\pi/4$ -shifted QPSK (quadrature phase shift keying), which is supplied from the modem 13, with a local oscillation signal having a predetermined frequency output from the PLL synthesizer 15, to convert the modulated signal into a signal having a frequency of 1.9 GHz and sends out the signal from the antenna ANT via the antenna switch 14.

In the receiver of the modem 13, the IF signal from the receiver 11 of the frequency converter is demodulated, the demodulated signal is divided into series of data items I and Q, and they are transmitted to a TDMA (Time Division Multiple Access) processor 16. In the transmitter of the modem 13, I and Q data are generated from data supplied from the TDMA processor 16

and modulated by  $\pi/4$  shift QPSK, and the modulated data is supplied to the transmitter 12 of the frequency converter.

The TDMA processor 16 time-divides a radio frequency signal to execute TDMA processing for transmitting/receiving a signal in a burst way in a specific time zone. More specifically, on the reception side of the TDMA processor 16, data for one slot is taken out of the data supplied from the modem 13 in predetermined timing, and a unique word (sync signal) is extracted from the data to generate a frame sync signal. Then, a scramble of control data and sound data sections is canceled, and control and sound data is obtained from the format of the slot. Control data is sent to a controller 23 and sound data is transmitted to a speech CODEC (Coder/Decoder) 17. On the transmission side of the processor 16, the control data is added to the sound data transmitted from the speech CODEC 17 to generate transmission data. The scramble is added to the transmission data and then the unique word is added thereto to prepare transmission data for one slot. The transmission data is transmitted to the modem 13 in a predetermined timing or through a slot assigned thereto.

The TDMA processor 16 is so operated that the signals transmitted from the master (base station) or slave (radio communication terminal, PHS terminal) do not collide at the same frequency in order to make them intercommunicate with each other. Each base station sends a signal to a time slot assigned in a frame and performs time position control (burst synchronization control) to prevent the signal from colliding with another signal.

The foregoing speech CODEC 17 is designed to compress/extend digital data and constituted of a receiver section and a transmitter section. The receiver section extends an ADPCM sound signal (4 bits  $\times$  8 KHz = 32 Kbps), which is supplied from the TDMA processor 16, by decoding the ADPCM sound signal into a PCM sound signal (8 bits  $\times$  8 KHz = 64 Kbps), and sends the extended signal to a speech conversion circuit 18. The transmitter section compresses the PCM sound signal, which is supplied from the speech conversion circuit 18, by encoding the PCM sound signal into an ADPCM sound signal, and sends the compressed signal to the TDMA processor 16.

The speech conversion circuit 18 is designed to convert an analog signal to a digital one, and vice versa. A receiver section of the circuit 18 converts a PCM sound signal supplied from the speech CODEC 17, into an analog sound signal to make a sound from a speaker 20, while a transmitter section thereof converts an analog sound signal supplied from a microphone 21, into a PCM signal and transmits it to the speech CODEC 17. The speaker 20 and microphone 21 constitute a handset by connecting their handles to each other.

A key-in section 22 includes numeral keys for inputting callee's telephone numbers, switches for on-hook and off-hook modes, and a volume switch for varying a

sound level. The conditions of the keys and switches are supplied to the controller 23. The controller 23 then controls the entire system in accordance with a predetermined program.

5 A ROM 24 stores programs executed by the controller 23, various parameters such as CS-ID previously written by a communication service provider and the like, and a RAM 25 stores data generated according to a control operation of the controller 23 and serves as a work area. The data stored in the RAM 25 is maintained by a power supply such as a secondary battery (not shown).

10 A display section 26 includes an LCD for displaying various types of data items such as operation modes, telephone numbers and call time, service menus offered by service companies, and the like, and an LED for showing ON and OFF states of a switch. The display section 26 is constituted of a touch panel in which the data items are displayed. If a user indicates (depresses) 15 an icon or the like using or not using a touch pen (not shown), a function corresponding to the icon is performed.

20 An EEPROM 27 stores a password for confirming whether the PHS terminal is used by a genuine user. In a second embodiment, the information necessary for peer-to-peer communication and stored in the ID chip 28 is stored in the EEPROM 27, as described later. The password is input by a user in starting to use or operate the PHS terminal. The input password is compared with 25 the password stored in the EEPROM 27. If they are identical with each other, it is determined that the user is a genuine one.

25 In order to discriminate between the master CS-ID (described later) and PHS terminal, a slave ID number and the like are stored in an ID chip 28, which is detachable from the PHS terminal. The details of the ID chip 28 will be described later.

30 An interface 29 is provided to receive/transmit data from/to the ID chip 28, and includes an attachment/detachment detector for detecting that the ID chip 28 is attached to the PHS terminal. A result detected by the detector is supplied to the controller 23. A ringer 30 rings to inform a user of the received call or the like.

### 45 3. Outward Appearance of PHS:

FIG. 3 is a perspective view schematically showing the outward appearance of the PHS terminal 4 described above. In FIG. 3, the same structural elements as those of FIG. 2 are denoted by the same reference numerals and their descriptions are omitted.

50 Referring to FIG. 3, the speaker 20, display section 26, key-in section 22, and microphone 21 are provided on one face of the housing of the PHS terminal 4. A slot 32 into which the ID chip 28 is inserted is formed in the bottom portion of the housing. One end of the ID chip 28, which contacts the innermost of the slot, is provided with a terminal (not shown) fitted into the attachment/detachment detector of the interface 29. As

described above, the detachable ID chip 28 can be attached to another PHS terminal 4, too.

#### 4. Configuration of ID Chip:

FIG. 4 is a block diagram showing a configuration of the ID chip 28 described above. As shown in FIG. 4, the ID chip 28 includes a CPU 40, a ROM 41, a RAM 42, an EEPROM 43 and a connector 44.

The CPU 40 executes communication control for transmitting/receiving various data items to/from the PHS terminal 4. The ROM 41 stores programs executed by the CPU 40. The RAM 42 is used as a work area when the programs are executed.

The EEPROM 43 stores data as shown in FIG. 5. In FIG. 5, "TELEPHONE NUMBER" shows an area for storing callee's numbers used in originating calls and incoming calls, "SIMPLIFIED DIALING" indicates an area for storing telephone directories and the like, "TRANSCEIVER CODE" denotes an area for storing codes for peer-to-peer communication between terminals, and "OTHERS" shows an area for storing information, such as extension numbers, call time, and charges, which is not included in the above three areas.

The connector 44 has terminals for a reset signal, an SIO (Serial I/O) signal, a clock signal, a VCC signal and a ground signal. The reset signal is for resetting the CPU 40 of the ID chip 28. The SIO signal is a two-way data signal to transmit/receive data to/from the controller 23 of the PHS terminal 4. The clock signal is supplied to the CPU 40 in the ID chip 28. The VCC is a signal line for applying a power supply voltage.

#### 5. Structure of CS-ID:

Each master 2 stores CS-ID for discriminating a master corresponding to the PHS terminal 4. FIG. 6 is a schematic view of the configuration of the CS-ID. The CS-ID is 42 bits in total and includes a system calling code of 29 bits and an additional ID of 13 bits. When a master 2 is registered in its slave PHS terminal 4, the CS-ID is transmitted from the master 2 to the PHS terminal 4 by a predetermined operation and stored in the internal store (EEPROM 27) of the PHS terminal 4, with the result that the master 2 and PHS terminal 4 correspond to each other and they can intercommunicate with each other accordingly. The part (system calling code) of the CS-ID stored in the PHS terminal 4 is copied in a transceiver code area of the EEPROM 43 when a predetermined operation is performed in the PHS terminal 4 into which the IC chip 28 is inserted.

#### 6. Constitution of Controlling Physical Slot:

In the radio communication (between a base station and a terminal or between terminals) according to the above-described embodiment, the PHS terminal 4 discriminates between the transmission and reception sides

by the controlling physical slot shown in FIG. 7 when a radio channel is.

As shown in FIG. 7, the physical slot is 240 bits in total, and includes a transition response ramp time R (4 bits), a start symbol SS (2 bits), a preamble PR (62 bits), a sync word UW (32 bits), a channel type CI (4 bits), a receiving identification code (42 bits), a calling identification code (28 bits), data I (34 bits), CRC (16 bits), and guard bits G (16 bits).

Among them, the receiving and calling identification codes are relevant to the present invention. In the radio communication between the base station and terminal, the 42-bit CS-ID as shown in FIG. 6 is written into an area of the receiving identification code, and 28-bit PS-ID for identification a terminal is written into an area of the calling identification code (FIG. 7 shows an example of an up-link channel and, in a down-link channel, 42-bit CS-ID is the calling identification code and 28-bit PS-ID is the receiving identification code).

10 In the radio communication between the terminals, as shown in FIG. 8, the receiving identification code includes a system calling code (29 bits) for identifying the master, as described above, and a PS calling number (13 bits) for identifying the PHS terminal on the called or receiving side. The calling identification code includes a PS calling code (PS-ID) for identifying the PHS terminal on the calling side. The PS calling number is a logic number which is effective only for peer-to-peer communication between slaves.

15 20 25 30 35 40 45 50 55 60 65 70 75 80 85 90 95 100 105 110 115 120 125 130 135 140 145 150 155 160 165 170 175 180 185 190 195 200 205 210 215 220 225 230 235 240 245 250 255 260 265 270 275 280 285 290 295 300 305 310 315 320 325 330 335 340 345 350 355 360 365 370 375 380 385 390 395 400 405 410 415 420 425 430 435 440 445 450 455 460 465 470 475 480 485 490 495 500 505 510 515 520 525 530 535 540 545 550 555 560 565 570 575 580 585 590 595 600 605 610 615 620 625 630 635 640 645 650 655 660 665 670 675 680 685 690 695 700 705 710 715 720 725 730 735 740 745 750 755 760 765 770 775 780 785 790 795 800 805 810 815 820 825 830 835 840 845 850 855 860 865 870 875 880 885 890 895 900 905 910 915 920 925 930 935 940 945 950 955 960 965 970 975 980 985 990 995 1000 1005 1010 1015 1020 1025 1030 1035 1040 1045 1050 1055 1060 1065 1070 1075 1080 1085 1090 1095 1100 1105 1110 1115 1120 1125 1130 1135 1140 1145 1150 1155 1160 1165 1170 1175 1180 1185 1190 1195 1200 1205 1210 1215 1220 1225 1230 1235 1240 1245 1250 1255 1260 1265 1270 1275 1280 1285 1290 1295 1300 1305 1310 1315 1320 1325 1330 1335 1340 1345 1350 1355 1360 1365 1370 1375 1380 1385 1390 1395 1400 1405 1410 1415 1420 1425 1430 1435 1440 1445 1450 1455 1460 1465 1470 1475 1480 1485 1490 1495 1500 1505 1510 1515 1520 1525 1530 1535 1540 1545 1550 1555 1560 1565 1570 1575 1580 1585 1590 1595 1600 1605 1610 1615 1620 1625 1630 1635 1640 1645 1650 1655 1660 1665 1670 1675 1680 1685 1690 1695 1700 1705 1710 1715 1720 1725 1730 1735 1740 1745 1750 1755 1760 1765 1770 1775 1780 1785 1790 1795 1800 1805 1810 1815 1820 1825 1830 1835 1840 1845 1850 1855 1860 1865 1870 1875 1880 1885 1890 1895 1900 1905 1910 1915 1920 1925 1930 1935 1940 1945 1950 1955 1960 1965 1970 1975 1980 1985 1990 1995 2000 2005 2010 2015 2020 2025 2030 2035 2040 2045 2050 2055 2060 2065 2070 2075 2080 2085 2090 2095 2100 2105 2110 2115 2120 2125 2130 2135 2140 2145 2150 2155 2160 2165 2170 2175 2180 2185 2190 2195 2200 2205 2210 2215 2220 2225 2230 2235 2240 2245 2250 2255 2260 2265 2270 2275 2280 2285 2290 2295 2300 2305 2310 2315 2320 2325 2330 2335 2340 2345 2350 2355 2360 2365 2370 2375 2380 2385 2390 2395 2400 2405 2410 2415 2420 2425 2430 2435 2440 2445 2450 2455 2460 2465 2470 2475 2480 2485 2490 2495 2500 2505 2510 2515 2520 2525 2530 2535 2540 2545 2550 2555 2560 2565 2570 2575 2580 2585 2590 2595 2600 2605 2610 2615 2620 2625 2630 2635 2640 2645 2650 2655 2660 2665 2670 2675 2680 2685 2690 2695 2700 2705 2710 2715 2720 2725 2730 2735 2740 2745 2750 2755 2760 2765 2770 2775 2780 2785 2790 2795 2800 2805 2810 2815 2820 2825 2830 2835 2840 2845 2850 2855 2860 2865 2870 2875 2880 2885 2890 2895 2900 2905 2910 2915 2920 2925 2930 2935 2940 2945 2950 2955 2960 2965 2970 2975 2980 2985 2990 2995 3000 3005 3010 3015 3020 3025 3030 3035 3040 3045 3050 3055 3060 3065 3070 3075 3080 3085 3090 3095 3100 3105 3110 3115 3120 3125 3130 3135 3140 3145 3150 3155 3160 3165 3170 3175 3180 3185 3190 3195 3200 3205 3210 3215 3220 3225 3230 3235 3240 3245 3250 3255 3260 3265 3270 3275 3280 3285 3290 3295 3300 3305 3310 3315 3320 3325 3330 3335 3340 3345 3350 3355 3360 3365 3370 3375 3380 3385 3390 3395 3400 3405 3410 3415 3420 3425 3430 3435 3440 3445 3450 3455 3460 3465 3470 3475 3480 3485 3490 3495 3500 3505 3510 3515 3520 3525 3530 3535 3540 3545 3550 3555 3560 3565 3570 3575 3580 3585 3590 3595 3600 3605 3610 3615 3620 3625 3630 3635 3640 3645 3650 3655 3660 3665 3670 3675 3680 3685 3690 3695 3700 3705 3710 3715 3720 3725 3730 3735 3740 3745 3750 3755 3760 3765 3770 3775 3780 3785 3790 3795 3800 3805 3810 3815 3820 3825 3830 3835 3840 3845 3850 3855 3860 3865 3870 3875 3880 3885 3890 3895 3900 3905 3910 3915 3920 3925 3930 3935 3940 3945 3950 3955 3960 3965 3970 3975 3980 3985 3990 3995 4000 4005 4010 4015 4020 4025 4030 4035 4040 4045 4050 4055 4060 4065 4070 4075 4080 4085 4090 4095 4100 4105 4110 4115 4120 4125 4130 4135 4140 4145 4150 4155 4160 4165 4170 4175 4180 4185 4190 4195 4200 4205 4210 4215 4220 4225 4230 4235 4240 4245 4250 4255 4260 4265 4270 4275 4280 4285 4290 4295 4300 4305 4310 4315 4320 4325 4330 4335 4340 4345 4350 4355 4360 4365 4370 4375 4380 4385 4390 4395 4400 4405 4410 4415 4420 4425 4430 4435 4440 4445 4450 4455 4460 4465 4470 4475 4480 4485 4490 4495 4500 4505 4510 4515 4520 4525 4530 4535 4540 4545 4550 4555 4560 4565 4570 4575 4580 4585 4590 4595 4600 4605 4610 4615 4620 4625 4630 4635 4640 4645 4650 4655 4660 4665 4670 4675 4680 4685 4690 4695 4700 4705 4710 4715 4720 4725 4730 4735 4740 4745 4750 4755 4760 4765 4770 4775 4780 4785 4790 4795 4800 4805 4810 4815 4820 4825 4830 4835 4840 4845 4850 4855 4860 4865 4870 4875 4880 4885 4890 4895 4900 4905 4910 4915 4920 4925 4930 4935 4940 4945 4950 4955 4960 4965 4970 4975 4980 4985 4990 4995 5000 5005 5010 5015 5020 5025 5030 5035 5040 5045 5050 5055 5060 5065 5070 5075 5080 5085 5090 5095 5100 5105 5110 5115 5120 5125 5130 5135 5140 5145 5150 5155 5160 5165 5170 5175 5180 5185 5190 5195 5200 5205 5210 5215 5220 5225 5230 5235 5240 5245 5250 5255 5260 5265 5270 5275 5280 5285 5290 5295 5300 5305 5310 5315 5320 5325 5330 5335 5340 5345 5350 5355 5360 5365 5370 5375 5380 5385 5390 5395 5400 5405 5410 5415 5420 5425 5430 5435 5440 5445 5450 5455 5460 5465 5470 5475 5480 5485 5490 5495 5500 5505 5510 5515 5520 5525 5530 5535 5540 5545 5550 5555 5560 5565 5570 5575 5580 5585 5590 5595 5600 5605 5610 5615 5620 5625 5630 5635 5640 5645 5650 5655 5660 5665 5670 5675 5680 5685 5690 5695 5700 5705 5710 5715 5720 5725 5730 5735 5740 5745 5750 5755 5760 5765 5770 5775 5780 5785 5790 5795 5800 5805 5810 5815 5820 5825 5830 5835 5840 5845 5850 5855 5860 5865 5870 5875 5880 5885 5890 5895 5900 5905 5910 5915 5920 5925 5930 5935 5940 5945 5950 5955 5960 5965 5970 5975 5980 5985 5990 5995 6000 6005 6010 6015 6020 6025 6030 6035 6040 6045 6050 6055 6060 6065 6070 6075 6080 6085 6090 6095 6100 6105 6110 6115 6120 6125 6130 6135 6140 6145 6150 6155 6160 6165 6170 6175 6180 6185 6190 6195 6200 6205 6210 6215 6220 6225 6230 6235 6240 6245 6250 6255 6260 6265 6270 6275 6280 6285 6290 6295 6300 6305 6310 6315 6320 6325 6330 6335 6340 6345 6350 6355 6360 6365 6370 6375 6380 6385 6390 6395 6400 6405 6410 6415 6420 6425 6430 6435 6440 6445 6450 6455 6460 6465 6470 6475 6480 6485 6490 6495 6500 6505 6510 6515 6520 6525 6530 6535 6540 6545 6550 6555 6560 6565 6570 6575 6580 6585 6590 6595 6600 6605 6610 6615 6620 6625 6630 6635 6640 6645 6650 6655 6660 6665 6670 6675 6680 6685 6690 6695 6700 6705 6710 6715 6720 6725 6730 6735 6740 6745 6750 6755 6760 6765 6770 6775 6780 6785 6790 6795 6800 6805 6810 6815 6820 6825 6830 6835 6840 6845 6850 6855 6860 6865 6870 6875 6880 6885 6890 6895 6900 6905 6910 6915 6920 6925 6930 6935 6940 6945 6950 6955 6960 6965 6970 6975 6980 6985 6990 6995 7000 7005 7010 7015 7020 7025 7030 7035 7040 7045 7050 7055 7060 7065 7070 7075 7080 7085 7090 7095 7100 7105 7110 7115 7120 7125 7130 7135 7140 7145 7150 7155 7160 7165 7170 7175 7180 7185 7190 7195 7200 7205 7210 7215 7220 7225 7230 7235 7240 7245 7250 7255 7260 7265 7270 7275 7280 7285 7290 7295 7300 7305 7310 7315 7320 7325 7330 7335 7340 7345 7350 7355 7360 7365 7370 7375 7380 7385 7390 7395 7400 7405 7410 7415 7420 7425 7430 7435 7440 7445 7450 7455 7460 7465 7470 7475 7480 7485 7490 7495 7500 7505 7510 7515 7520 7525 7530 7535 7540 7545 7550 7555 7560 7565 7570 7575 7580 7585 7590 7595 7600 7605 7610 7615 7620 7625 7630 7635 7640 7645 7650 7655 7660 7665 7670 7675 7680 7685 7690 7695 7700 7705 7710 7715 7720 7725 7730 7735 7740 7745 7750 7755 7760 7765 7770 7775 7780 7785 7790 7795 7800 7805 7810 7815 7820 7825 7830 7835 7840 7845 7850 7855 7860 7865 7870 7875 7880 7885 7890 7895 7900 7905 7910 7915 7920 7925 7930 7935 7940 7945 7950 7955 7960 7965 7970 7975 7980 7985 7990 7995 8000 8005 8010 8015 8020 8025 8030 8035 8040 8045 8050 8055 8060 8065 8070 8075 8080 8085 8090 8095 8100 8105 8110 8115 8120 8125 8130 8135 8140 8145 8150 8155 8160 8165 8170 8175 8180 8185 8190 8195 8200 8205 8210 8215 8220 8225 8230 8235 8240 8245 8250 8255 8260 8265 8270 8275 8280 8285 8290 8295 8300 8305 8310 8315 8320 8325 8330 8335 8340 8345 8350 8355 8360 8365 8370 8375 8380 8385 8390 8395 8400 8405 8410 8415 8420 8425 8430 8435 8440 8445 8450 8455 8460 8465 8470 8475 8480 8485 8490 8495 8500 8505 8510 8515 8520 8525 8530 8535 8540 8545 8550 8555 8560 8565 8570 8575 8580 8585 8590 8595 8600 8605 8610 8615 8620 8625 8630 8635 8640 8645 8650 8655 8660 8665 8670 8675 8680 8685 8690 8695 8700 8705 8710 8715 8720 8725 8730 8735 8740 8745 8750 8755 8760 8765 8770 8775 8780 8785 8790 8795 8800 8805 8810 8815 8820 8825 8830 8835 8840 8845 8850 8855 8860 8865 8870 8875 8880 8885 8890 8895 8900 8905 8910 8915 8920 8925 8930 8935 8940 8945 8950 8955 8960 8965 8970 8975 8980 8985 8990 8995 9000 9005 9010 9015 9020 9025 9030 9035 9040 9045 9050 9055 9060 9065 9070 9075 9080 9085 9090 9095 9100 9105 9110 9115 9120 9125 9130 9135 9140 9145 9150 9155 9160 9165 9170 9175 9180 9185 9190 9195 9200 9205 9210 9215 9220 9225 9230 9235 9240 9245 9250 9255 9260 9265 9270 9275 9280 9285 9290 9295 9300 9305 9310 9315 9320 9325 9330 9335 9340 9345 9350 9355 9360 9365 9370 9375 9380 9385 9390 9395 9400 9405 9410 9415 9420 9425 9430 9435 9440 9445 9450 9455 9460 9465 9470 9475 9480 9485 9490 9495 9500 9505 9510 9515 9520 9525 9530 9535 9540 9545 9550 9555 9560 9565 9570 9575 9580 9585 9590 9595 9600 9605 9610 9615 9620 9625 9630 9635 9640 9645 9650 9655 9660 9665 9670 9675 9680 9685 9690 9695 9700 9705 9710 9715 9720 9725 9730 9735 9740 9745 9750 9755 9760 9765 9770 9775 9780 9785 9790 9795 9800 9805 9810 9815 9820 9825 9830 9835 9840 9845 9850 9855 9860 9865 9870 9875 9880 9885 9890 9895 9900 9905 9910 9915 9920 9925 9930 9935 9940 9945 9950 9955 9960 9965 9970 9975 9980 9985 9990 9995 9999 10000 10005 10010 10015 100

peer-to-peer mode by selecting the peer-to-peer communication information stored in the internal memory.

### 7-1. First embodiment

FIG. 11 is a flowchart showing a process of registering a system calling code (part of CS-ID) and a slave ID number (PS calling code) in the ID chip 28 from a predetermined PHS terminal.

If a registration mode is selected by the key-in section 22 of the PHS terminal 4, a message for urging an operator to input his or her password, for example, a message "PLEASE INPUT PASSWORD" is displayed on the display section 26 in step S10.

In step S12, it is determined whether the password is input or not. If no password is input, the flow returns to step S10. If the password is input, the flow advances to step S14.

In step S14, it is determined whether the input password coincides with that stored in advance in the EEPROM 27. If they do not coincide, the flow returns to step S10. After that, steps S10 to S14 are repeated until the correct password is input. If it is not input even though the steps are repeated by a given number, the registration can be finished. If both the passwords are identical with each other, the flow advances to step S16.

In step S16, it is determined whether the ID chip 28 is inserted into the PHS terminal. If NO, the flow goes to step S18.

In step S18, a message for urging the operator to set the ID chip 28, for example, a message "PLEASE SET ID CHIP" is displayed on the display section 26, and the flow returns to step S16, where the terminal waits for the operator to set the ID chip 28. If the ID chip 28 is already inserted into the terminal or it is set according to the message, the flow advances to step S20.

In step S20, a message for urging the operator to input a slave ID number, for example, a message "PLEASE INPUT SLAVE ID NUMBER" is displayed on the display section 26.

In step S22, it is determined whether the slave ID number is input or not. The slave ID number corresponds to the foregoing PS calling number and serves to call the PHS terminal on the receiving-side in peer-to-peer communication between terminals.

According to the embodiment of the present invention, the slave ID number is input by the key-in section 22, but can be assigned automatically on the base station 2 of the master. If the slave ID number is not input in step S22, the flow returns to step S16. After that, the steps S16 to S22 are repeated until the slave ID number is input. If the slave ID number is input in step S22, the flow advances to step S24.

In step S24, it is determined whether the slave ID number has been registered or not. If YES in step S24, the flow goes to step S26. In step S26, a message for informing the operator that the slave ID number has been registered, for example, a message "REGIS-

TERED" is displayed on the display section 26. The flow returns to step S16.

If the slave ID number has not yet been registered, the flow goes from step S24 to step S28. In step S28, the system code and input slave ID number are transmitted to the ID chip 28 through the interface 29, and they are stored in the transceiver code area of the EEPROM 43.

In step S30, a message for informing the operator that input slave ID number is registered, for example, a message "SLAVE ID NUMBER N IS REGISTERED" is displayed on the display section 26. "N" indicates the actually-input slave ID number.

In step S32, it is determined whether the registration is completed or not. If NO, the flow returns to step S16. If YES, the registration ends.

As described above, the ID chip 28 set in the PHS terminal 4 (for example, 4a) stores the system code for identifying the master 2 to which the PHS terminal 4 is previously registered and the slave ID number for identifying the PHS terminal (on the receiving side).

If a user removes the ID chip 28 from the PHS terminal 4 and goes out and sets it in another PHS terminal (for example, 4b) which is not registered in the master 2, the peer-to-peer communication can be performed between the PHS terminals 4a and 4b having different system codes which are previously registered, by selecting the peer-to-peer communication information stored in the ID chip 28 of the PHS terminal 4b.

### 7-2. Second embodiment

The second embodiment will be described hereinafter. The second embodiment can be realized by slightly modifying the first embodiment so that only different portions will be described with reference to the flowchart of the first embodiment shown in FIG. 11. The description is made for an example in which the system code stored in the ID chip 28 is copied into the EEPROM 27 of the PHS terminal 4.

The ID chip 28 storing a system code of another master 2 is attached to the PHS terminal 4. If the registration mode is selected by using the key-input section 22, the flowchart shown in FIG. 11 starts.

A message for urging an operator to input his or her password is displayed on the display section 26 and it is determined whether the input password coincides with that stored in the EEPROM 27 (steps S10, S12 and S14).

When the correct password is input, it is determined whether the ID chip 28 is inserted into the PHS terminal (step S16).

If the ID chip 28 is not inserted, a message for urging the operator to set the ID chip 28, for example, a message "PLEASE SET ID CHIP" is displayed on the display section 26 (step S18).

If the ID chip 28 is already inserted into the terminal or it is set according to the message, a message for urging the operator to input a slave ID number, for example,

a message "PLEASE INPUT SLAVE ID NUMBER" is displayed on the display section 26 (step S20). The flow advances step S22 and it is determined whether the slave ID number is input or not.

The slave ID number corresponds to the foregoing PS calling number and serves to call the PHS terminal on the receiving-side in peer-to-peer communication between terminals. According to the embodiment of the present invention, the slave ID number is input by the key-in section 22, but can be assigned automatically on the base station 2 of the master.

If the slave ID number is input by the user in accordance with the guidance message in step S22, it is determined whether the input slave ID number has been registered or not based on the slave ID number stored in the ID chip 28 (step S24). If YES in step S24, a message for informing the operator that the input slave ID number has been registered, for example, a message "REGISTERED" is displayed on the display section 26.

If the slave ID number has not yet been registered, the PHS terminal 4 reads out the system code and the slave ID number from the ID chip 28 and registered them into the internal EEPROM 27 (step S28). In the ID chip 28, the input slave ID number is stored in the transceiver code area of the EEPROM 43.

Then, a message for informing the operator that input slave ID number is registered, for example, a message "SLAVE ID NUMBER N IS REGISTERED" is displayed on the display section 26 (step S30). "N" indicates the actually-input slave ID number.

In step S32, it is determined whether the registration is completed or not. If YES, the registration ends.

As described above, the system code for identifying another master 2 and the slave ID number which is previously registered in the master 2, both of which are stored in the ID chip 28 are copied into the EEPROM 27 of another PHS terminal 4 (for example, 4b) which is registered in the other master. As a result, the peer-to-peer communication can be performed between the PHS terminals 4a and 4b having different system codes which are previously registered, by selecting the peer-to-peer communication information stored in the ID chip 28 of the PHS terminal 4b.

Followings are the operation of the peer-to-peer communication using the peer-to-peer communication information registered in the first and second embodiments.

### 7-3. Communication Processing:

FIG. 12 is a conceptual view of a control sequence in peer-to-peer communication between PHS terminals in the system according to the present invention. Since the respective components of the PHS terminals, which are related to a call, are the same as those of the commonly-used PHS terminal, their operations are omitted. In the above embodiments, the system calling code is stored in the internal ROM 24 of the terminal and the ID chip 28. It is possible to select one of the internal ROM

24 aid the ID chip 28 based on a selection input from the key-in section 22 or a detection of setting the ID chip 28 to the terminal.

First, a user determines which system calling code should be used (code selected by the user or code selected by the ID chip detection) and performs an operation of making a call by key-in section 22 in the calling-side PHS terminal 4a for peer-to-peer communication between terminals. Then, as shown in FIG. 8, the system calling code (29 bits) of the CS-ID stored in the terminal, the PS calling number of the receiving-side slave ID number, and the PS calling code for discriminating the calling-side PHS terminal are combined, and the combined data (calling signal in STEP 1) is transmitted by radio through the controlling physical slot shown in FIG. 7. In the receiving-side PHS terminal 4b, the received system calling code and PS calling number of the physical slot and the system calling code and slave ID number stored in the ID chip 28 are compared, thereby recognizing that the terminal 4b is called. After that, sync words (sync signals in STEPS 2 and 3) are transmitted between the calling- and receiving-side PHS terminals 4a and 4b. In the receiving-side PHS terminal 4b, the system calling code stored in the ID chip 28, the calling-side slave ID number (PS calling number), and the receiving-side slave ID number (PS calling code) are combined, and the combined data (response signal in STEP 4) is transmitted by radio to the calling-side PHS terminal 4a through the controlling physical slot shown in FIG. 7. Thereafter, an idle burst is transmitted between the calling- and receiving-side PHS terminals 4a and 4b (STEPS 5 and 6), and peer-to-peer communication between the terminals is started (STEP 7 et seq.).

As described above, according to the foregoing embodiment, if a user goes out with the ID chip 28 and sets it in a PHS terminal registered in another master, the peer-to-peer communication can be performed between PHS terminals even though these terminals are not registered in their common master.

The maximum transmission time of the foregoing "calling signal" can be set to 10 seconds in consideration of battery saving on the receiving side. In the receiving-side PHS terminal 4b, the "sync signal" can be canceled and the "response signal" can directly be returned in automatic response. In the calling-side PHS terminal 4a, the counting of transmission time can be started when the "calling signal" is transmitted and, in the receiving-side PHS terminal 4b, it can be started when the "sync signal" is transmitted.

In the above-described embodiment, part of the CS-ID stored in the ID chip 28 cannot be used for a call between a terminal and its corresponding master 2 and, in other words, it is used only for peer-to-peer communication between terminals (transceiver communication); therefore, it need not be erased particularly. However, it can be erased automatically after a fixed period of time elapses or if a predetermined number of calls are made.

Furthermore, a plurality of system calling codes can be stored in the ROM 24, the EEPROM 27 or the ID chip 28, and one of them for use can be selected by a certain method, e.g., by operating the key-in section 22. Since, in this case, the ID chip can be applied to a plurality of masters, the PHS terminals capable of peer-to-peer communication can be increased in number.

Further, in the second embodiment of the present invention, the system calling code (e.g., CS-IDB of the communication terminal B) which is previously stored in the detachable memory (e.g., ID chip 28) can be stored in the internal memory of the radio terminal (e.g., the radio communication terminal B).

As described above, according to the present invention, a radio communication terminal has a detachable storing medium, this medium is set in an other radio communication terminal, and at least base station information necessary for peer-to-peer communication is stored in the medium, thereby obtaining the advantage that the peer-to-peer communication between the former terminal and the latter terminal, which is not registered in the master of the former terminal, can be performed.

Additional advantages and modifications will readily occur to those skilled in the art. Therefore, the present invention in its broader aspects is not limited to the specific details, representative devices, and illustrated examples shown and described herein. Accordingly, various modifications may be made without departing from the spirit or scope of the general inventive concept as defined by the appended claims and their equivalents.

## Claims

1. A system (2) connected to a communication network (1) and having a system identification information, characterized by comprising:

a storing medium (28);  
 a first radio communication terminal (4a, A) having the same system identification information (CS-ID A) as said system (2) and arranged for receiving said storing medium (28); and  
 a second radio communication terminal (4b, B) arranged for receiving said storing medium (28), and characterized in that  
 said first radio communication terminal (4a, A), when said storing medium (28) is installed therein, copies the system identification information (CS-ID A) onto said storing medium (28), and  
 said second radio communication terminal (4b, B) is allowed to communicate in peer-to-peer mode by a radio wave with said first communication terminal (4a), when said storing medium (28) on which the system identification information of said system (2) is copied is installed theron.

2. The system (2) according to claim 1, characterized in that said second radio communication terminal (4b, B) has a system identification information (CS-ID B) which is different from the system identification information of said system (2), and automatically switches, when said storing medium (28) on which the system identification information of said system (2) is copied is installed thereon, to the system identification information (CS-ID A) copied on said storing medium (28), to communicate in peer-to-peer mode by a radio wave with said first communication terminal (4a).

3. The system according to claim 1, characterized in that said second radio communication terminal (4b, B) has an original system identification information (CS-ID B) which is different from the system identification information of said system (2), and comprises a selecting means adapted to be operated by a user for, when said storing medium (28) on which the system identification information of said system (2) is copied is installed thereon, selecting one of the original system identification information (CS-ID B) and the system identification information (CS-ID A) copied on said storing medium (28).

4. The system according to claim 1, characterized in that said copying is allowed only when a correct password is input before said copying operation is carried out (steps S10, S12, and S14).

5. A system (2) connected to a communication network (1) and having a system identification information, characterized by comprising:

a storing medium (28) having the system identification information (CS-ID A);  
 a first radio communication terminal having the same system identification information (CS-ID A) as said system (2) and arranged for receiving said storing medium (28); and  
 a second radio communication terminal arranged for receiving said storing medium (28), and characterized in that said second radio communication terminal, when a detachable storing medium is set thereto, copies the system identification information (CS-ID A) of said storing medium (28) into an internal memory (27) of said second radio communication terminal, and is allowed to communicate in peer-to-peer mode by a radio wave with a first radio communication terminal (4a, A) based on the system identification information (CS-ID A) copied in the internal memory (27) of said second radio communication terminal.

6. The system (2) according to claim 5, characterized in that said second radio communication terminal (B) has a system identification information (CS-ID

B) which is different from the system identification information (CS-ID A) of said system (2), and automatically switches, when said internal memory (27) on which the system identification information of said system (2) is copied is installed thereon, to the system identification information (CS-ID A) copied on said internal memory (27), to communicate in peer-to-peer mode by a radio wave with said first communication terminal.

7. The system (2) according to claim 5, characterized in that said second radio communication terminal (B) has an original system identification information (CS-ID B) which is different from the system identification information (CS-ID A) of said system (2), and comprises a selecting means adapted to be operated by a user for, when said internal memory (27) on which the system identification information of said system (2) is installed thereon, selecting one of the original system identification information (CS-ID B) and the system identification information (CS-ID A) copied on said internal memory (27).

8. The system (2) according to claim 5, characterized in that said copying is allowed only when a correct password is input before said copying operation is carried out (steps S10, S12, and S14).

9. A system (2) characterized by comprising:

a storing medium (28);  
a first radio communication terminal (4a, A) having a same system identification information as said system (2) and arranged for receiving said storing medium (28); and  
a second radio communication terminal (4b, B) arranged for receiving said storing medium (28), and characterized in that  
said first radio communication terminal (A), when said storing medium (28) is installed therein, copies the system identification information onto said storing medium (28), and  
said second radio communication terminal (4b, B) is allowed to communicate in peer-to-peer mode by a radio wave with said first communication terminal (A), when said storing medium on which the system identification information (CS-ID A) of said system (2) is copied is installed thereon.

10. The system (2) according to claim 9, characterized in that said second radio communication terminal (B) has a system identification information (CS-ID B) which is different from the system identification information (CS-ID A) of said system (2), and automatically switches, when said storing medium (28) on which the system identification information of said system (2) is copied is installed thereon, to the system identification information (CS-ID A) copied on said storing medium (28), to communicate in peer-to-peer mode by a radio wave with said first communication terminal (A).

5      11. The system (2) according to claim 9, characterized in that said second radio communication terminal (B) has an original system identification information (CS-ID B) which is different from the system identification information (CS-ID A) of said system (2), and comprises a selecting means adapted to be operated by a user for, when said storing medium (28) on which the system identification information (CS-ID A) of said system (2) is copied is installed thereon, selecting one of the original system identification information (CS-ID B) and the system identification information (CS-ID A) copied on said storing medium (28).

10     12. The system (2) according to claim 9, characterized in that said copying is allowed only when a correct password is input before said copying operation is carried out (steps S10, S12, and S14).

15     13. A system (2) characterized by comprising:  
a storing medium (28) having the system identification information (CS-ID);  
a first radio communication terminal (A) having the same system identification information as said system (2) and arranged for receiving said storing medium; and  
a second radio communication terminal (B) arranged for receiving said storing medium, and characterized in that said second radio communication terminal (B), when a detachable storing medium is set thereto, copies the system identification information (CS-ID A) of said storing medium (28) into an internal memory (27) of said second radio communication terminal (B), and is allowed to communicate in peer-to-peer mode by a radio wave with said first radio communication terminal (A) based on the system identification information (CS-ID A) copied in the internal memory (27) of said second radio communication terminal (B).

20     14. The system (2) according to claim 13, characterized in that said second radio communication terminal (B) has a system identification information (CS-ID B) which is different from the system identification information (CS-ID A) of said system (2), and automatically switches, when said internal memory (27) on which the system identification information (CS-ID A) of said system (2) is copied is installed thereon, to the system identification information (CS-ID A) copied on said internal memory (27), to communicate in peer-to-peer mode by a radio wave with said first communication terminal (A).

25     30     35     40     45     50     55

15. The system (2) according to claim 13, characterized in that said second radio communication terminal (B) has an original system identification information (CS-ID B) which is different from the system identification information (CS-ID A) of said system (2), and comprises a selecting means adapted to be operated by a user for, when said internal memory on which the system identification information (CS-ID A) of said system (2) is installed thereon, selecting one of the original system identification information (CS-ID B) and the system identification information (CS-ID A) copied on said internal memory.

16. The system (2) according to claim 13, characterized in that said copying is allowed only when a correct password is input before said copying operation is carried out (steps S10, S12, and S14).

17. In a system (2) having a system identification information and connected to a communication network (1), a radio communication terminal (4) having the same system identification information as the system (2) for communicating in a peer-to-peer mode with another radio communication terminal (4) having the same system identification information, characterized by comprising:

a storing medium (28) adapted to be detachably installed in said radio communication terminal (A);  
instruction means (22) for outputting an instruction; and  
writing means (23) for upon receipt of the instruction from said instruction means (22) writing the system identification information of said radio communication terminal on said storing medium (28) is installed on said radio communication terminal (A).

18. The radio communication terminal (4) according to claim 17, characterized by further comprising:

inputting means (22) for inputting a password; comparing means (23) for comparing an input password with a predetermined password; means (23) for allowing said writing means to execute writing operation when the input password coincides with the predetermined password.

19. In a system (2) connected to a communication network (1) including a radio communication terminal (4) having an original system identification information (CS-ID), for communicating in peer-to-peer mode with another radio communication terminal (4), characterized by comprising:

a storing medium (28) adapted to be detachably installed in said radio communication terminal (4), for storing a system identification information (CS-ID);  
selecting means (23) for, when said storing medium (28) having a system identification information (CS-ID) stored thereon is installed into said radio communication terminal (4), selecting any one of the original system identification information (CS-ID B) and the system identification information (CS-ID A) stored on said storing medium; and  
communication means (23) for communicating with another radio communication terminal (4) based on the system identification information (CS-ID) selected by said selecting means (23).

20. The radio communication terminal (4) according to claim 19, characterized in that said selecting means (23) automatically selects any one of the original system identification information (CS-ID B) and the system identification information (CS-ID A) stored on said storing medium (28) when said storing medium (28) is installed on said radio communication terminal (4).

21. The radio communication terminal (4) according to claim 19, characterized by further comprising:

control means (22) externally operable by a user, for controlling said selecting means (23) to select any one of the original system identification information (CS-ID B) and the system identification information (CS-ID A) stored on said storing medium (28).

22. In a system (2) having an original system identification information and connected to a communication network (1) including a radio communication terminal (4) for communicating in peer-to-peer mode with another radio communication, characterized by comprising:

a first storing medium adapted to be detachably installed on said radio communication terminal (4a, A), for storing a system identification information (CS-ID A);  
a first internal memory (27) for storing a system identification information;  
writing means (23) for, when said storing medium (28) is installed on said radio communication terminal, writing the system identification information (CS-ID A) stored in said first storing medium on said first internal memory (27); and  
communication means (23) for communicating with another radio communication terminal based on the system identification information

written on said internal memory (27) by said writing means (23).

23. The radio communication terminal (4) according to claim 22, characterized by further comprising:

a second internal memory (24) for storing the original system identification information (CS-ID B); and  
 selecting means (23) for selecting one of the original system identification information (CS-ID B) stored in said second internal memory (24) and the system identification information (CS-ID A) written on said first internal memory (27) by said writing means (23), and characterized in that said communication means (23) communicates with another radio communication terminal based on the system identification information (CS-ID A) selected by said selecting means (23).

24. The radio communication terminal (4) according to claim 22, characterized by further comprising:

a second storing medium stores the original system identification information (CS-ID B) of said system (2); and  
 selecting means (23) for, when said second storing medium is installed on said radio communication terminal (B), selecting one of the original system identification information (CS-ID B) of said system (2) stored on said second storing medium and the system identification information (CS-ID A) previously written on said first internal memory (27) by said writing means (23), and characterized in that said communication means (23) communicates with another radio communication terminal (4) based on the system identification information (CS-ID A) selected by said selecting means (23).

25. A radio communication terminal (4) having a system identification information (CS-ID) as a system (2) for communicating in a peer-to-peer mode with another radio communication terminal (4) having the system identification information (CS-ID), characterized by comprising:

a storing medium (28) adapted to be detachably installed in said radio communication terminal (4);  
 instruction means (22) for outputting an instruction; and  
 writing means (23) for upon receipt of the instruction from said instruction means (22) writing the system identification information of said radio communication terminal (4) on said

storing medium (28) is installed on said radio communication terminal (4).

26. The radio communication terminal (4) according to claim 25, characterized by further comprising:

inputting means (22) for inputting a password; comparing means (23) for comparing an input password with a predetermined password; and means (23) for allowing said writing means (23) to execute writing operation when the input password coincides with the predetermined password.

27. A radio communication terminal (4) having an original system identification information (CS-ID B), for communicating in peer-to-peer mode with another radio communication terminal (4), characterized by comprising:

a storing medium (28) adapted to be detachably installed in said radio communication terminal (4), for storing a system identification information (CS-ID A);  
 selecting means (23) for, when said storing medium (28) having a system identification information (CS-ID A) stored thereon is installed into said radio communication terminal (4), selecting any one of the original system identification information (CS-ID B) and the system identification information (CS-ID A) stored on said storing medium (28); and communication means (23) for communicating with another radio communication terminal based on the system identification information (CS-ID) selected by said selecting means (23).

28. The radio communication terminal (4) according to claim 27, characterized in that said selecting means (23) automatically selects any one of when said storing medium (28) is installed on said radio communication terminal (4).

29. The radio communication terminal (4) according to claim 27, characterized by further comprising:

control means (22) externally operable by a user, for controlling said selecting means (23) to select any one of the original system identification information (CS-ID B) and the system identification information (CS-ID A) stored on said storing medium (28).

30. A radio communication terminal (4) for communicating in peer-to-peer mode with another radio communication (4), characterized by comprising:

first storing medium adapted to be detachably installed on said radio communication terminal

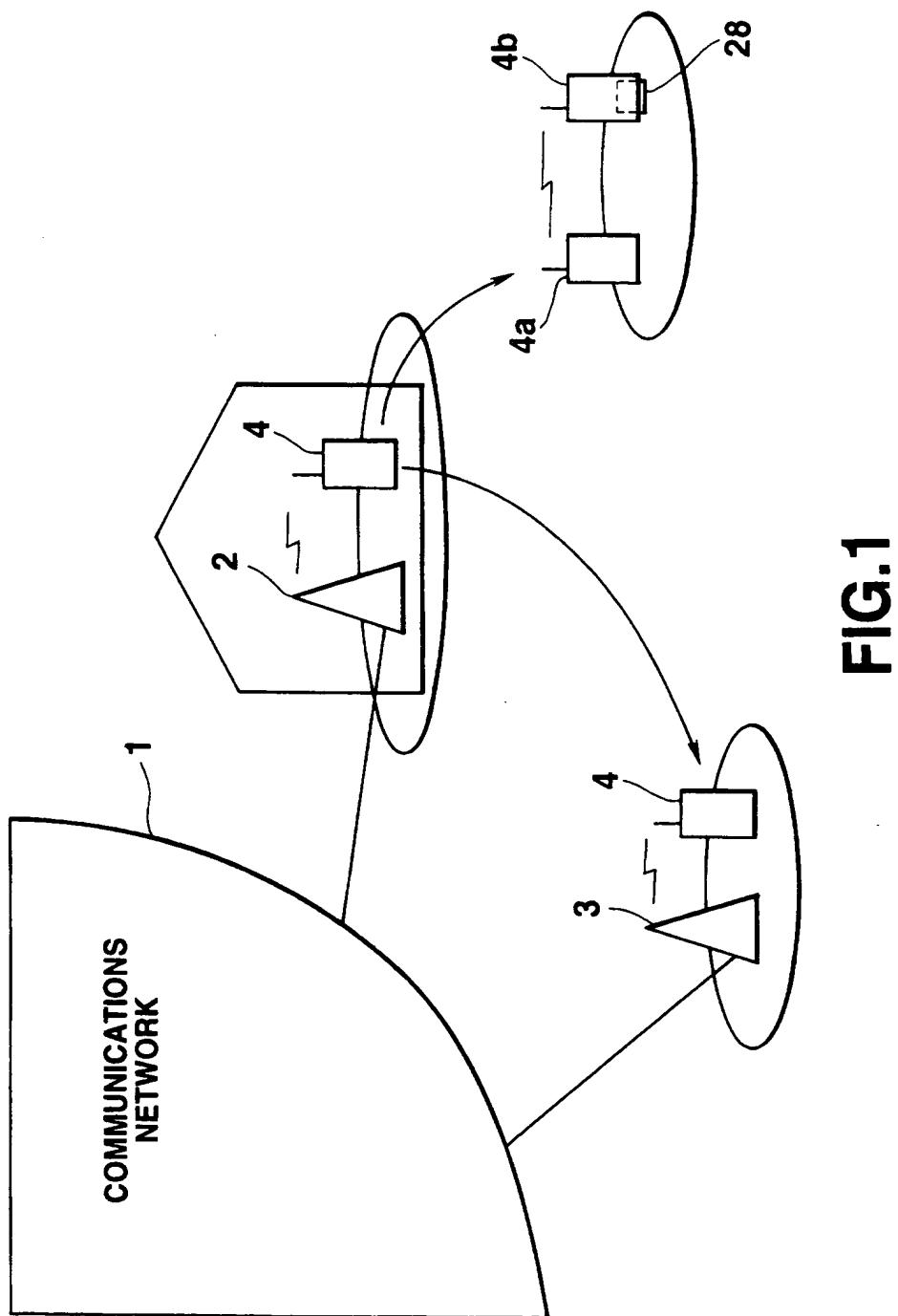
(4), for storing a system identification information (CS-ID A);  
 a first internal memory (27) for storing a system identification information (CS-ID);  
 writing means (23) for, when said storing medium is installed on said radio communication terminal (A), writing the system identification information (CS-ID A) stored in said first storing medium on said first internal memory (27); and  
 communication means (23) for communicating with another radio communication terminal (4) based on the system identification information (CS-ID) written on said internal memory (27) by said writing means (23). 15

31. The radio communication terminal (4) according to claim 30, characterized by comprising:

a second internal memory (24) for storing the original system identification information (CS-ID); and  
 selecting means (23) for selecting any one of the original system identification information (CS-ID) stored in said second internal memory (24) and the system identification information (CS-ID) written on said first internal memory (27) by said writing means (23), and characterized in that said communication means (23) communicates with another radio communication terminal (4) based on the system identification information (CS-ID) selected by said selecting means (23). 20

32. The radio communication terminal (4) according to claim 30, characterized by further comprising:

a second storing medium stores the original system identification information (CS-ID B) of said system (2); and  
 selecting means (23) for, when said second storing medium installed on said radio communication terminal (B), selecting any one of the original system identification information (CS-ID B) of said system (2) stored on said second storing medium and the system identification information (CS-ID A) previously written on said first internal memory (27) by said writing means (23), and characterized in that said communication means (23) communicates with another radio communication terminal (A) based on the system identification information (CS-ID) selected by said selecting means (23). 35



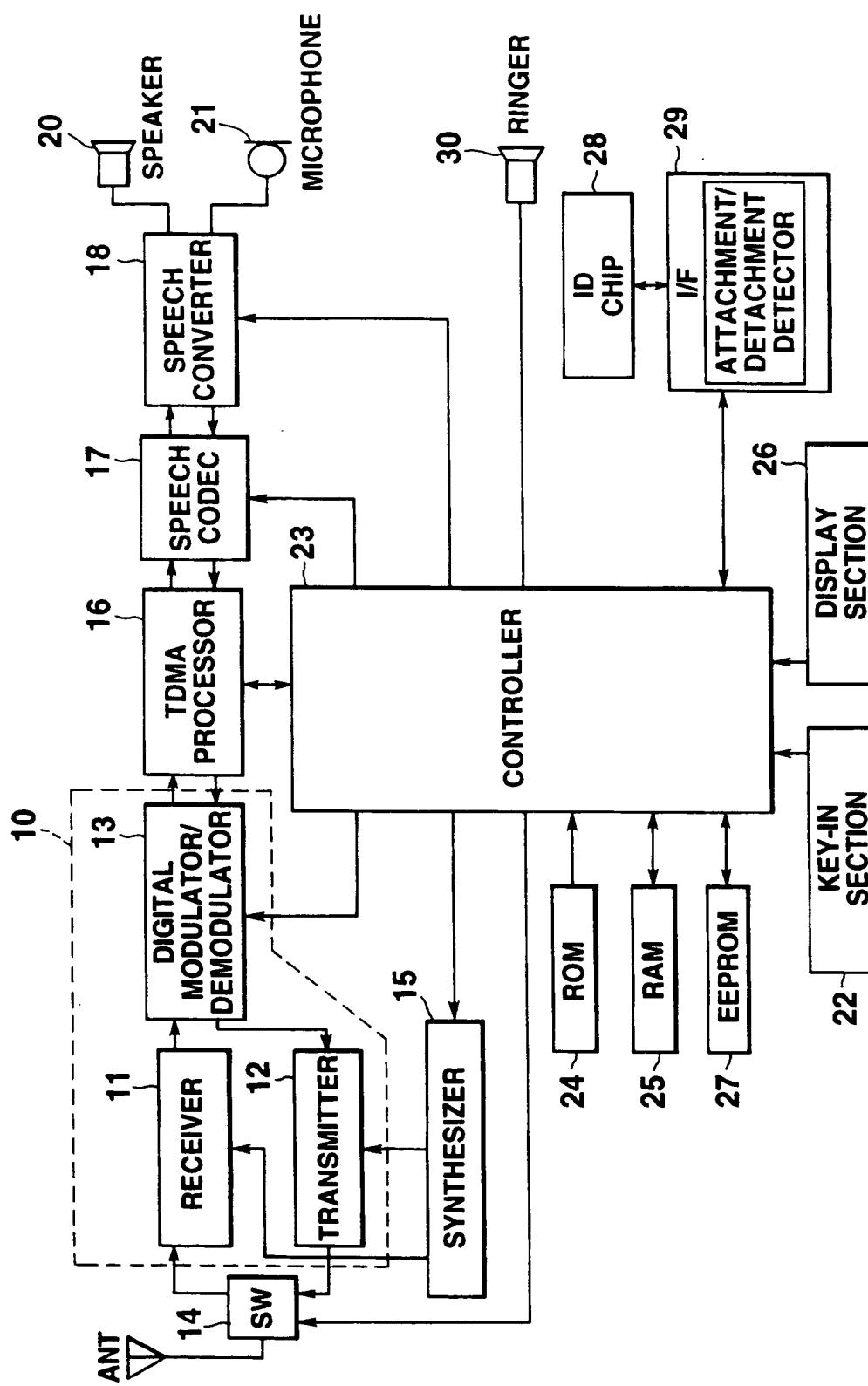
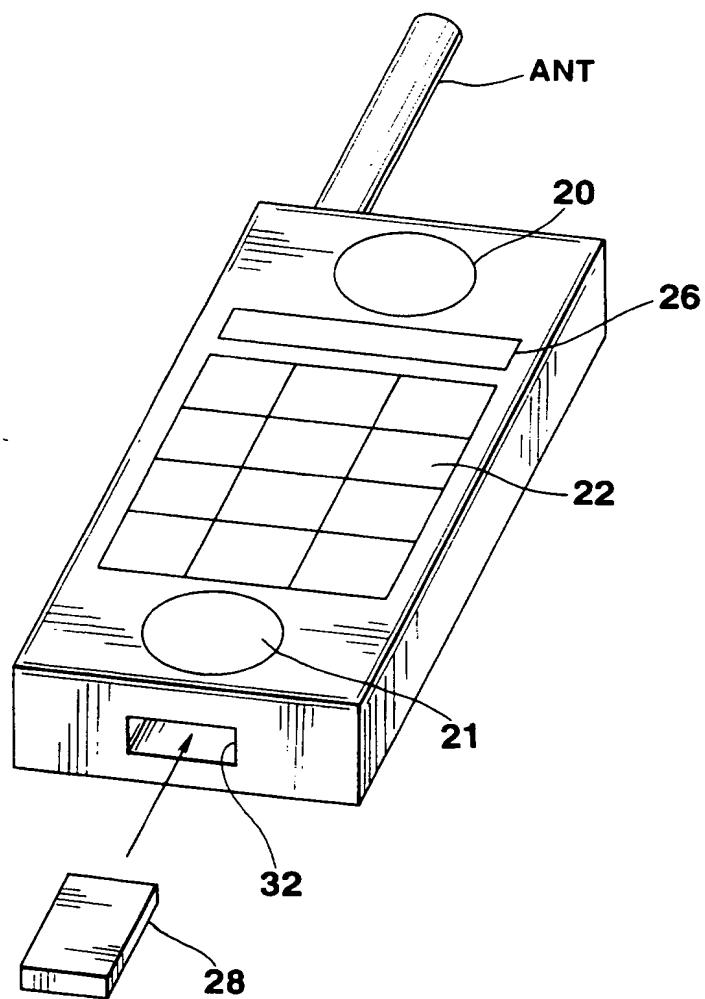
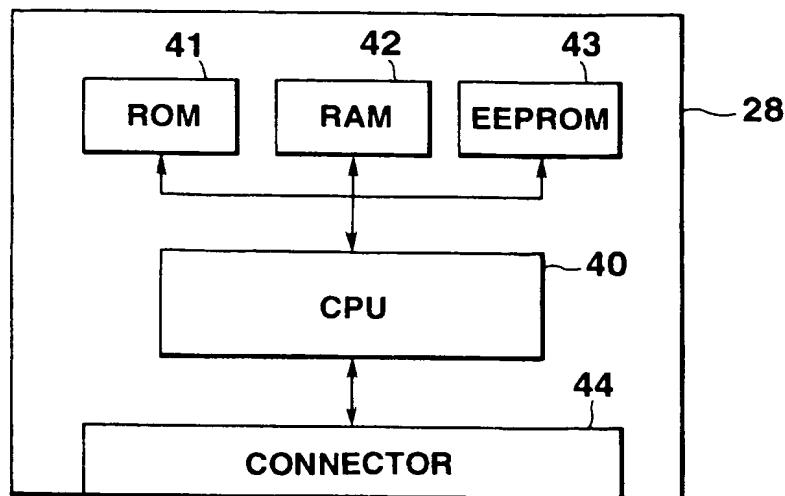


FIG.2



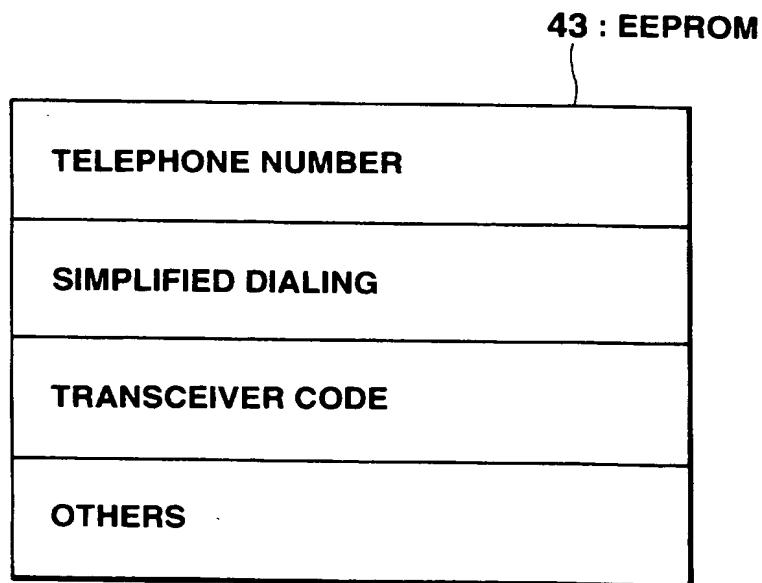
**FIG.3**



**SIGNAL SERIES OF CONNECTOR**

RESET --- RESET SIGNAL FOR CPU IN ID CHIP  
SIO ---- BIDIRECTIONAL DATA SIGNAL(SERIAL IO)  
CLOCK --- CLOCK SIGNAL FOR CPU IN ID CHIP  
VCC ----- POWER SUPPLY  
GND -- GROUND

**FIG.4**



**FIG.5**

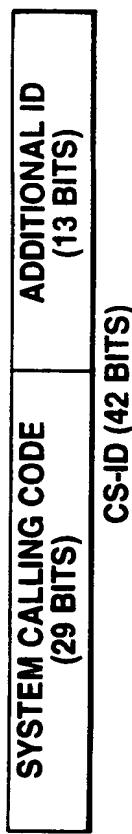


FIG. 6

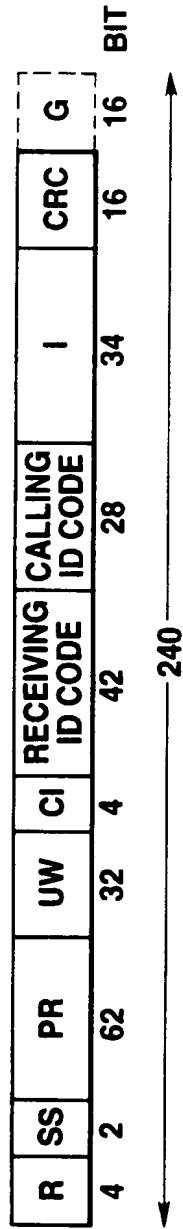


FIG. 7

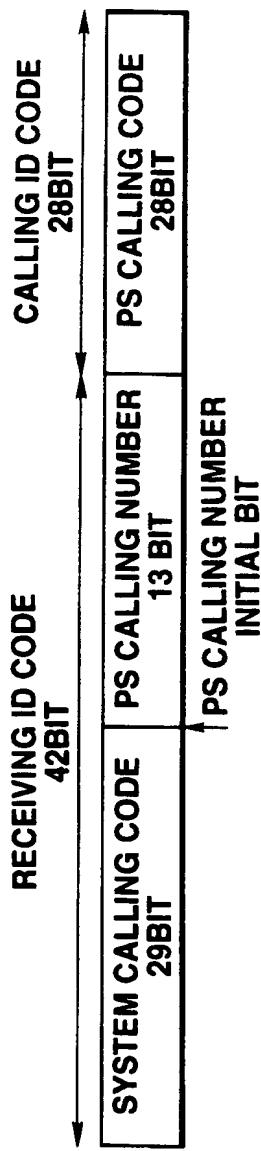
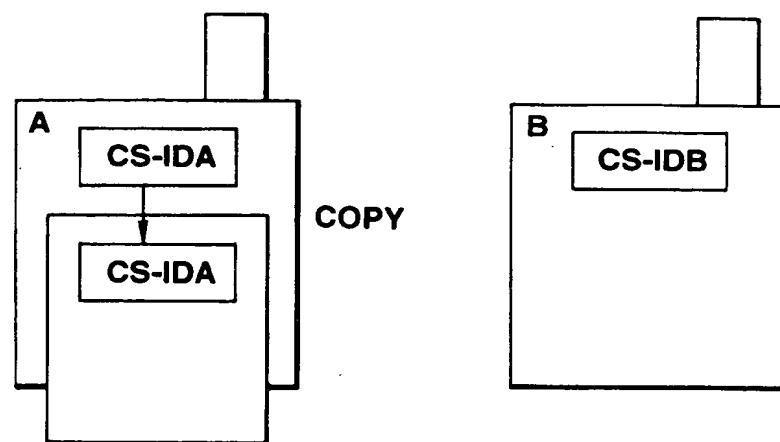
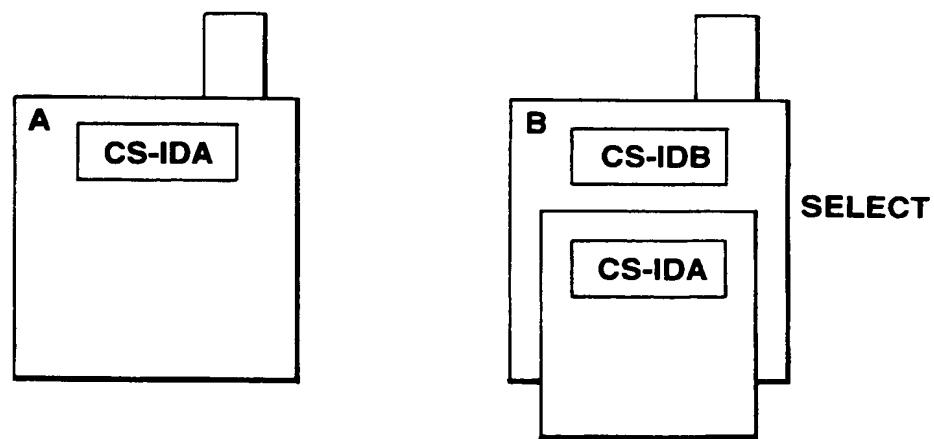


FIG. 8

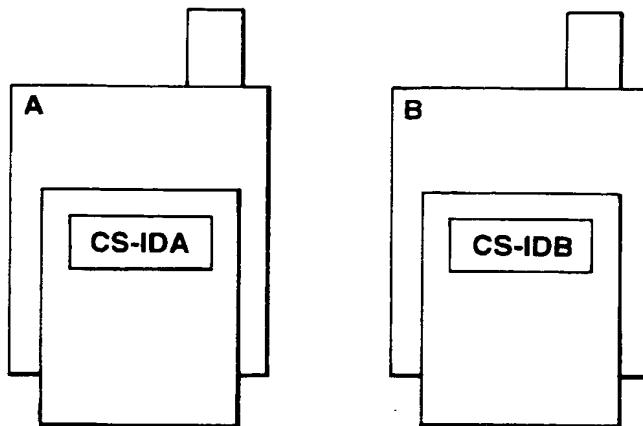
**FIG.9A**



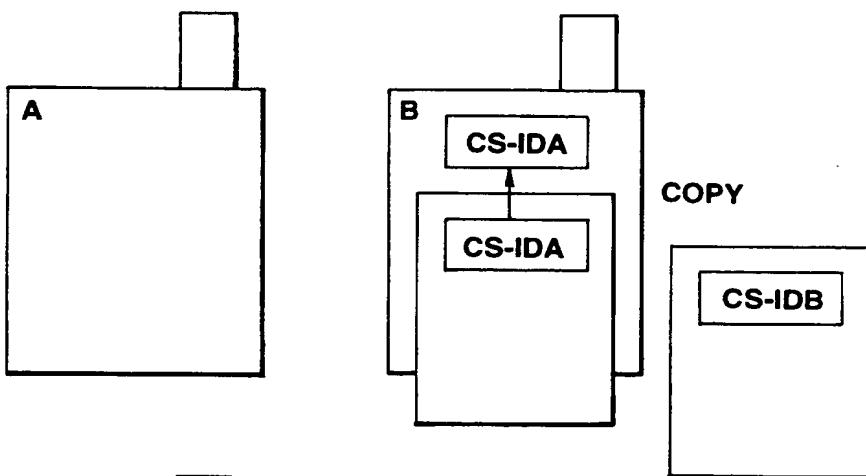
**FIG.9B**



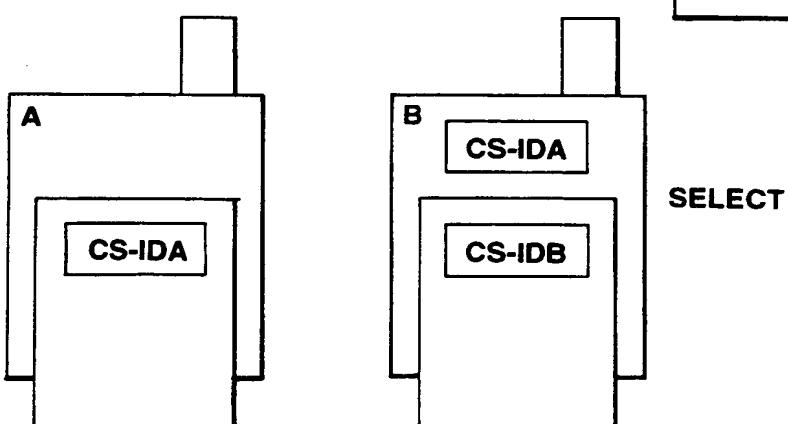
**FIG.10A**



**FIG.10B**



**FIG.10C**



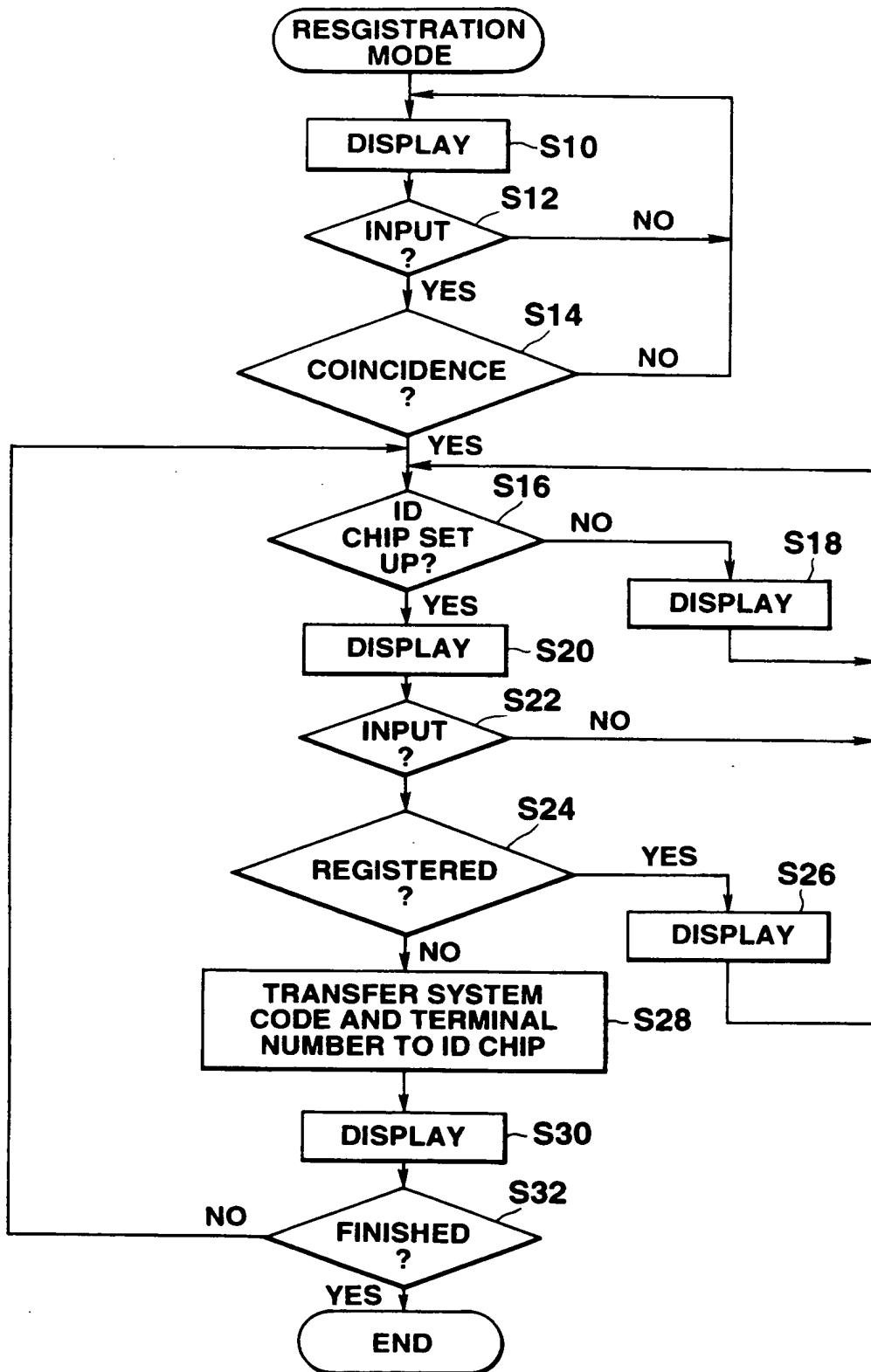
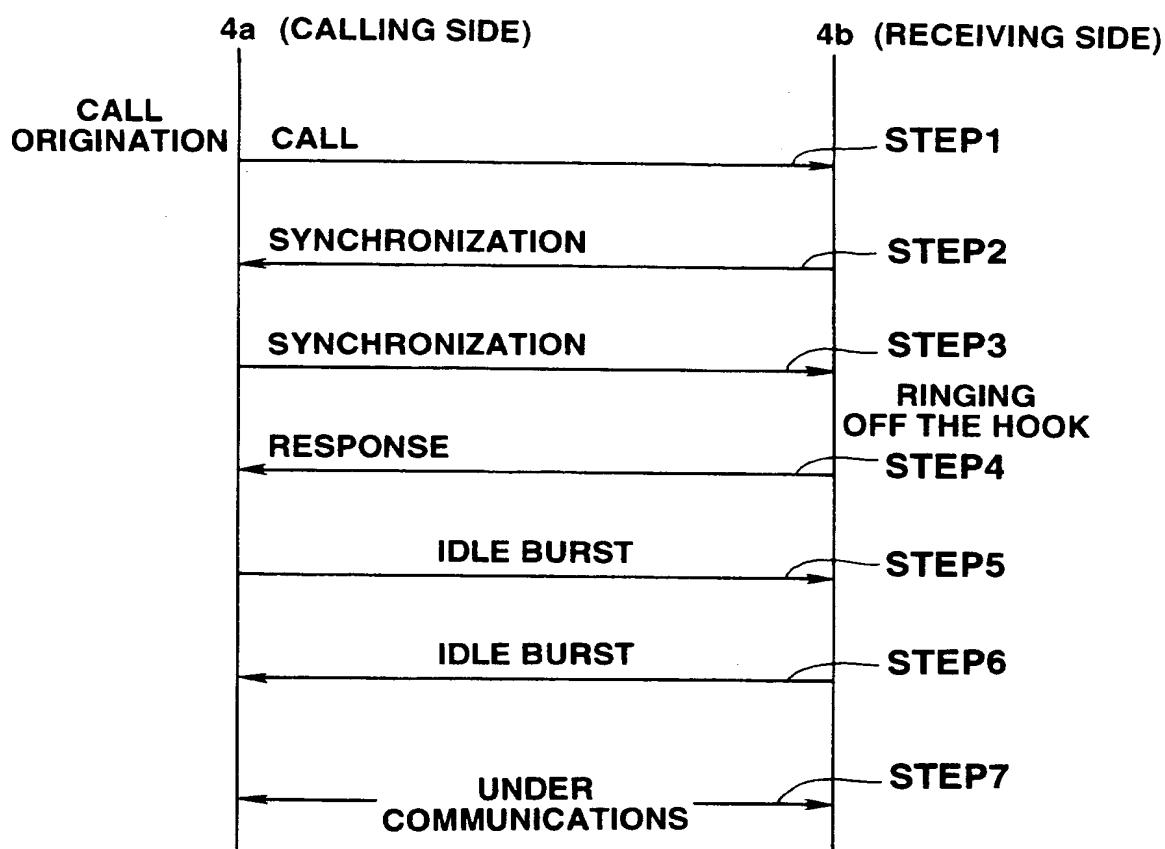


FIG.11

**FIG.12**



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EP 0 739 149 A3

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• Uchikura, Takao,  
c/o Hamura R&D Center  
Hamura-chi, Tokyo 190-11 (JP)  
• Muroi, Katsumi,  
c/o Hamura R&D Center  
Hamura-chi, Tokyo 190-11 (JP)

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(74) Representative:  
Grünecker, Kinkeldey,  
Stockmair & Schwanhäusser  
Anwaltssozietät  
Maximilianstrasse 58  
80538 München (DE)

(71) Applicant:  
Casio Computer Co., Ltd.  
Shibuya-ku, Tokyo 151-8543 (JP)

(72) Inventors:  
• Ishikawa, Hiroyuki,  
c/o Hamura R&D Center  
Hamura-chi, Tokyo 190-11 (JP)

### (54) Radio communication system and radio communication terminal

(57) In a PHS terminal (4a), a system calling code for identifying a system in which the PHS terminal (4a) is registered and a slave ID number for discriminating the PHS terminal are stored in advance in an ID chip (28). While a user is out, he or she sets the ID chip (28) in another PHS terminal (4b) which does not have the same system calling code as that of the PHS terminal (4a). When the user performs an operation for peer-to-peer communication on the PHS terminal (4a), the PHS terminal (4b) is called using a controlling physical slot. The PHS terminal (4b) recognizes that it is called by discriminating a system calling code and a PS calling number of the physical slot on the basis of the system calling code of the ID chip (28), and then transmits a response signal to the PHS terminal (4a) based on the system calling code and PS calling number of the ID chip (28). Thus, peer-to-peer communication can be performed even between radio communication terminal (4)s which do not have the same system calling code.

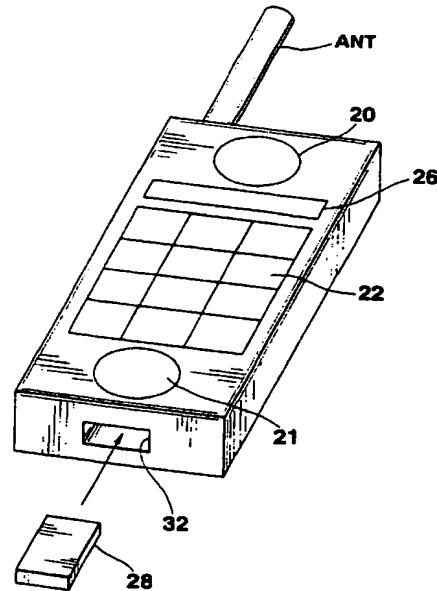


FIG.3



European Patent  
Office

## EUROPEAN SEARCH REPORT

Application Number  
EP 96 10 6118

| DOCUMENTS CONSIDERED TO BE RELEVANT  |  |                   | CLASSIFICATION OF THE APPLICATION (Int.Cl.6)            |
|--|--|-------------------|---|
| Category   | Citation of document with indication, where appropriate, of relevant passages  | Relevant to claim |   |
| A  | GB 2 270 442 A (MOTOROLA INC)<br>9 March 1994 (1994-03-09)<br>* abstract *<br>* page 7, line 15 - page 8, line 14 *<br>* page 11, line 14 - page 14, line 24 *<br>* figures 1-4 *<br>----            | 1-32              | H04Q7/32<br>H04Q7/22                                    |
| A  | DE 43 21 381 A (SEL ALCATEL AG)<br>5 January 1995 (1995-01-05)<br>* abstract *<br>* column 1, line 3 - line 26 *<br>* column 2, line 21 - column 3, line 4 *<br>* figures 1-4 *<br>----              | 1-32              |   |
| A  | US 5 212 809 A (OKA TOMOHIKO)<br>18 May 1993 (1993-05-18)<br>* abstract *<br>* column 1, line 25 - line 33 *<br>* column 2, line 8 - line 33 *<br>* figure 1 *<br>----                               | 1-32              |   |
| A  | WO 95 04425 A (ERICSSON GE MOBILE<br>COMMUNICAT) 9 February 1995 (1995-02-09)<br>* abstract *<br>* page 3, line 11 - line 19 *<br>* page 6, line 27 - page 8, line 29 *<br>* figures 1A,1B *<br>---- | 1-32              | TECHNICAL FIELDS<br>SEARCHED (Int.Cl.6)<br>H04B<br>H04Q |
| A  | EP 0 538 014 A (TOKYO SHIBAURA ELECTRIC<br>CO) 21 April 1993 (1993-04-21)<br>* abstract *<br>* column 1, line 55 - column 2, line 48 *<br>----   | 1-32              |   |
| The present search report has been drawn up for all claims                       |  |                   |   |
| Place of search  | Date of completion of the search   | Examiner          |   |
| MUNICH   | 14 September 1999  | Rabe, M           |   |
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ANNEX TO THE EUROPEAN SEARCH REPORT  
ON EUROPEAN PATENT APPLICATION NO.

EP 96 10 6118

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on. The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

14-09-1999

| Patent document cited in search report |   | Publication date | Patent family member(s) |              | Publication date |
|--|---|------------------|-------------------------|--------------|------------------|
| GB 2270442                             | A | 09-03-1994       | CA                      | 2101953 A    | 05-03-1994       |
|  |   |                  | FR                      | 2695526 A    | 11-03-1994       |
|  |   |                  | IT                      | 1262405 B    | 19-06-1996       |
|  |   |                  | SG                      | 52266 A      | 28-09-1998       |
| DE 4321381                             | A | 05-01-1995       | NONE                    |              |                  |
| US 5212809                             | A | 18-05-1993       | JP                      | 2071623 A    | 12-03-1990       |
|  |   |                  | CA                      | 1313398 A    | 02-02-1993       |
| WO 9504425                             | A | 09-02-1995       | US                      | 5418837 A    | 23-05-1995       |
|  |   |                  | CN                      | 1116025 A    | 31-01-1996       |
|  |   |                  | DE                      | 4495679 T    | 21-09-1995       |
|  |   |                  | DK                      | 32995 A      | 29-03-1995       |
|  |   |                  | FI                      | 951504 A     | 29-03-1995       |
|  |   |                  | FR                      | 2710224 A    | 24-03-1995       |
|  |   |                  | GB                      | 2286095 A, B | 02-08-1995       |
|  |   |                  | JP                      | 8505027 T    | 28-05-1996       |
|  |   |                  | SE                      | 9501027 A    | 22-05-1995       |
| EP 0538014                             | A | 21-04-1993       | JP                      | 5110507 A    | 30-04-1993       |
|  |   |                  | CA                      | 2080709 A    | 17-04-1993       |
|  |   |                  | KR                      | 9700563 B    | 13-01-1997       |

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